Direct Phase II SBIR Grants to Support Extended Development, Hardening, and Dissemination of Technologies in Biomedical Computing, Informatics, and Big Data Science (R44)

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The official link for this solicitation is: http://grants.nih.gov/grants/guide/pa-files/PAR-15-288.html

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Department of Health and Human Services

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Description:

This Funding Opportunity Announcement (FOA) is aimed to encourage Small Business Innovation Research (SBIR) grant applications from small business concerns (SBCs),which ensure the availability, continued usefulness (through extended development), and software hardening of existing technologies in biomedical computing, informatics and big data science.

This FOA enables a small business that has accomplished the objectives of a Phase I SBIR grant through non-SBIR funds to initiate the Phase II SBIR stage of

development, without needing to perform more early stage, Phase-I-SBIR-type research. This FOA will **not** accept 'regular' Phase II submissions from SBCs for projects that have completed the proof of concept Phase I stage-type of research through SBIR or STTR award from NIH or any other agency that participates in the SBIR/STTR programs. For this FOA, it is expected that the technology, prototype, or method will have passed the proof of principle stage and that the product has demonstrated feasibility and supports a Phase II effort. Data or evidence of the capability (including a statement of any Phase I-like quantitative milestones), completeness of design, and efficacy must be provided in the application, along with the rationale for selection of the criteria used to validate the technology, prototype, or method, similar to a Phase I final report required in standard Phase II applications.

This FOA is coordinated by the NIH Big Data Initiative (BD2K) and the Biomedical Information Science and Technology Initiative (BISTI) committees. Through this and related opportunities, Institutes and Centers of the NIH offer support for: fundamental research in biomedical computing, informatics, and Big Data Science; continued development, maintenance and hardening of software, tools and related resources; and applications of computational technologies to a particular domain area(s) in biomedical research. Information on these programs and related funding opportunities from participating Institutes and Centers of NIH can be found at http://www.bd2k.nih.gov and http://www/bisti.nih.gov. Note that in this document, the term "biomedical" will be used in the broadest sense to include biological, biomedical, behavioral, social, environmental, and clinical studies that relate to understanding health and disease. Applicants are reminded to carefully check that the proposed research lies in the mission of the participant Institutes and Centers of the initiative.

In addition to applications for funding in biomedical computing and informatics research that have been accepted under previous BISTI funding opportunity announcements, this announcement acknowledges new opportunities are also emerging as large and complex data sets are becoming increasingly available to the research community. While the biomedical research enterprise is producing increasingly large amounts of digital data, it has not yet fully capitalized on the transformative opportunities that these data provide. As stated by the Data and Informatics Working Group (DIWG) of the Advisory Committee to the NIH Director, "Colossal changes in biomedical research technologies and methods have shifted the bottleneck in scientific productivity from data production to data management, communication, and interpretation."

(http://acd.od.nih.gov/Data%20and%20Informatics%20Working%20Group%20Report.pdf). In this context, the term "Big Data Science" is meant to capture the opportunities and address the challenges facing all biomedical researchers in releasing, accessing, managing, analyzing, and integrating datasets of diverse data types. Such data types may include imaging, phenotypic, molecular (including –omics), physiological, anatomical, clinical, behavioral, environmental, and many other types of biological and biomedical data. They may also include data generated for other purposes (e.g., social media, search histories, and cell phone data).

Applications under this program announcement can seek support to continue

development and maintenance of Big Data Science software. A number of features of the improved software are listed below. Any of these improvements should benefit the existing user community and/or have potential for attracting more users.

First, contemporary software should be easy to modify and extend, and must be fully documented. Users who experience problems with software should be able to correct the problem with minimal effort and a mechanism must exist for incorporating these corrections into the software. As the needs of a community of users change, the software that supports their research efforts must be adaptable as well. The ability of software to be repaired and to evolve is particularly important because the scientific discovery process is open-ended and ever-changing.

Second, interoperability among different software packages or among software and existing databases is a major challenge. Applications with the goal of extending interoperability are welcomed under this FOA. Portability to different types of hardware is a related area of challenge. Applications with the goal of improving software so that it operates on a variety of platforms employing different operating systems are also encouraged.

Finally, an important goal of the BD2K and BISTI Initiatives is to promote a culture where a large body of annotated and shareable data is available online to the broad biomedical research community. The development and use of data and metadata standards are critical for achieving this goal. The NIH has a number of efforts to stimulate the creation and support of community-based approaches to develop such standards. Investigators may participate in the development of data standards, and may serve as early testers and adopters of community-developed standards.

In the context of the research and development to extend, harden and disseminate established software,investigators should target one or multiple of the following four themes of biomedical computing, informatics, and Big Data science that will enable progress in biomedical research.

1. Collaborative environments and technologies: An applicant addresses the issues of releasing Big Data and tools and gaining access to and using Big Data and tools. Examples include, but are not limited to:

- Knowledge environments
- Research commons
- Scalable, extensible, and maintainable methods of data and metadata curation
- Data security and privacy, and technical areas related to other ethical, legal,

and social implications of Big Data

2. Data integration: An applicant may propose efficient and effective ways to create connections across data types (i.e., unimodal or multimodal data integration). Examples of data types that could be addressed include, but are not limited to:

- Omics data (e.g., genomics, proteomics, metabolomics, etc.)
- Image and physiological data (e.g., CT, PET/SPECT, sMRI, fMRI, rMRI, DTI, EEG, MEG, ultrasound, cellular level imaging, multi-electrode recording, etc.)
- Behavioral, social, and environmental data
- Clinical data (e.g., lab tests, pathology, imaging, diagnosis, electronic health records, etc.)
- Data from nontraditional sources (e.g., social media, mobile devices, etc.)
- Multiscale data (genomic, epigenomic, subcellular, cellular, network, organ, systems, organism, population levels)
- Multiplatform data (desktop, cloud-based storage, etc.)
- Data from multiple research areas and diseases (e.g., common inflammation pathways in cancer, obesity, immune diseases, and neurodegenerative diseases)
- Data with special considerations (e.g., sparse data, heterogeneous data, or very large or very small datasets)
- Human-computer interfaces and visualization

3. Analysis and modeling methodologies: An applicant may propose to develop approaches for modeling, simulation, or analysis to produce useful biomedical information in ways that current methods cannot provide. Examples include, but are not limited to:

- Processing of data to allow more efficient analyses
- Multidimensional statistical and computational methods for analyzing, inspecting, displaying, representing, parsing, and searching high-dimensional data
- Intensive longitudinal data analyses
- Spatio-temporal dynamical modeling and adaptive dynamical modeling (e.g., parameter fitting and optimization of complex time series data)
- Mechanistic modeling
- Agent-based, Ordinary Differential Equation (ODE), Partial Differential Equation (PDE), and stochastic methods
- Clinical decision-making
- Individualized therapies

- Multi-scale modeling
- Organ-based or whole-body-based modeling
- Population-based modeling

4. Computer science and statistical approaches: An applicant may propose to develop enabling technologies in basic computer science such as:

- Approaches for database development and management – ways to organize, store, and query Big Data
- Technological approaches to distributing, sharing, and compressing Big Data
- Crowdsourcing data annotation and data management
- Approaches for efficient and novel uses of cloud platforms

The biomedical computing, informatics, and Big Data science research and development should take place in the context of biomedical and behavioral research that is of interest across most NIH Institutes and Centers from basic biomedicine to research in all relevant organ systems and diseases.

Through separate funding opportunity announcements of similar scientific scope, participating Institutes and Centers invite applications for early stage development in biomedical computing, informatics, and Big Data science (R01) PA-14-155, extended development, hardening and dissemination of software technology (R01) PA-14-156, as well as early stage development in biomedical computing, informatics, and Big Data science through small business innovation research (SBIR) PA-14-154, and small business technology transfer (STTR) PA-14-157. Some NIH Institutes and Centers may have other grant mechanisms that could apply to biomedical computing projects. Applicants are encouraged to visit the BD2K and BISTI web sites for these and other relevant funding opportunities: http://www.bd2k.nih.gov/opportunities, and http://www.bisti.nih.gov/bistic_funding.cfm

Specific Areas of Interest

NIDA is interested in applications that promote the sharing and reuse of research data related to addiction. These applications could include the sharing and discovery of basic and clinical addiction-related study data, the harmonization or standardization of addiction study ontologies, data visualization, technologies to communicate and summarize addiction-related study findings and increasing the ubiquity of high performance computing.

NCI is interested in supporting the enhancement and commercialization of informatics tools and technologies that are in high demand by cancer investigators. Products of proposed development should have clear applications in accelerating research in cancer biology, cancer treatment and diagnosis, cancer prevention, cancer control and epidemiology, and/or cancer health disparities.